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ABSTRACT

This report presents national estimates of the prevalence of diagnosed attention deficit disorder (ADD) and/or learning disability (LD) in children in the United States. Differences in the prevalence of these conditions are examined for children with selected sociodemographic characteristics. Estimates in the report are based on data from the 1997 and 1998 National Health Interview Survey that included 8,647 children (ages 6-11). Results indicate that in 1997-98 more than 2.6 million children were reported to have had a diagnosis of ADD or LD. A diagnosis of only ADD was reported for 3% of children, a diagnosis of only LD for 4%, and a diagnosis of both conditions for 4%. The prevalence of ADD with or without LD was greater for boys. Having health insurance was associated with only ADD. Living in a low-income or mother-only family occurred more often among children with a diagnosis of LD. Children with LD were nearly five times more likely to be in special education than children with a diagnosis of only ADD. Children with ADD more often had contact with a mental health professional, used prescription medication regularly, and had frequent health care visits. Appended are: Technical Notes; and Definition of Terms. (Contains 32 references and 4 text tables.) (Author/CR)

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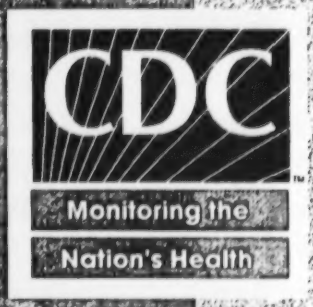

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Attention Deficit Disorder and Learning Disability: United States, 1997–98

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Attention Deficit Disorder and Learning Disability: United States, 1997–98

Data From the National Health Interview Survey

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
National Center for Health Statistics

Hyattsville, Maryland
May 2002
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Abstract

Objectives

This report presents national estimates of the prevalence of diagnosed Attention Deficit Disorder (ADD) and/or Learning Disability (LD) in U.S. children. Differences in the prevalence of these conditions are examined for children with selected sociodemographic characteristics. The occurrence of other health conditions and use of educational and health care services are contrasted for children with only ADD, those with only LD, those with both diagnoses, and those with neither diagnosis.

Methods

Estimates in this report are based on data from the National Health Interview Survey (NHIS), a national household survey of the civilian noninstitutionalized population of the United States. The analysis focuses on 8,647 children 6–11 years of age in the 1997 and 1998 NHIS.

Results

In 1997–98 over 2.6 million children 6–11 years of age were reported to have ever had a diagnosis of ADD or LD. A diagnosis of only ADD was reported for 3 percent of children, a diagnosis of only LD for 4 percent, and a diagnosis of both conditions for 4 percent. The prevalence of ADD with or without LD was greater for boys than for girls. Having health insurance was associated with a diagnosis of only ADD. Living in a low-income or mother-only family occurred more often among children with a diagnosis of LD.

Children with LD were nearly five times more likely to be in special education than children with a diagnosis of only ADD. Children with ADD, in contrast to children without this diagnosis, more often had contact with a mental health professional, used prescription medication regularly, and had frequent health care visits.

Keywords: children's health • learning and behavioral disorders • health care utilization

Attention Deficit Disorder and Learning Disability: United States, 1997–98

Patricia N. Pastor, Ph.D., and Cynthia A. Reuben, M.A., Division of Epidemiology

Highlights

Prevalence

- In 1997–98 over 2.6 million children 6–11 years of age were reported to have ever had a diagnosis of either Attention Deficit Disorder (ADD) or Learning Disability (LD). Three percent of children 6–11 years of age had been diagnosed with only ADD, 4 percent with only LD, and 4 percent with both conditions.
- The percent of boys as compared with girls with only ADD was almost 3 times greater and the percent with both diagnoses was over 2 times greater. The percent of boys and girls with only LD was similar.
- White non-Hispanic children were more often diagnosed with only ADD than black non-Hispanic or Hispanic children. The percent of children with only LD did not vary significantly by race or ethnicity.
- The association between other sociodemographic characteristics and diagnoses of ADD and LD varied by diagnostic category. Living in a low-income or mother-only family was associated with a diagnosis of LD, but not with a diagnosis of only ADD. Having private or public health insurance was associated with a diagnosis of only ADD.

Other Health Conditions

- The prevalence of mental retardation and other developmental delays was 1 percent for children with neither ADD nor LD, 31 percent for children with only LD, and 34 percent for children with both ADD and LD.
- The percent of children with health problems including impaired vision and hearing, allergies, and chronic health conditions other than asthma was greater for children with LD than for children with neither ADD nor LD.

Use of Special Education

- The percent of children enrolled in special education was nearly 5 times greater for children with LD than for children with only ADD and over 23 times greater than for children with neither diagnosis. Among children with LD, the percent of boys and girls in special education was similar.

NOTE: This report was prepared in the Population Epidemiology Branch of the Division of Epidemiology. The assistance and expertise of the following persons who contributed to this report is gratefully acknowledged. Diane M. Makuc, Thomas A. Hodgson, and Elsie R. Pamuk of the Office of Analysis, Epidemiology, and Health Promotion; and Gloria A. Simpson of the Division of Health Interview Statistics in the Office of Vital and Health Statistics Systems, and Ann M. Hardy of the National Institutes of Health provided helpful comments on the paper. The report was edited by Thelma W. Sanders and typeset by Annette F. Holman of the Publications Branch, Division of Data Services.

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Use of Health Care Services

- Use of mental health services during the past 12 months was greater among children with a diagnosis of ADD or LD: 17 percent for those with only LD, 34 percent for those with only ADD, and 51 percent for those with both diagnoses. Among children with neither diagnosis, 3 percent had contact with a mental health professional during the past 12 months.
- Contact with a medical specialist other than a mental health professional was greater for children with either ADD or LD than for children with neither diagnosis.
- Regular use of prescription medication was highest among children with ADD: 54 percent for children with only ADD and 61 percent for children with both ADD and LD. Use of prescription medication was lower among children without ADD: 14 percent for children with only LD and 6 percent for children with neither ADD nor LD.
- The percent of children with four or more health care visits during the past 12 months was 34 percent for children with only LD, 45 percent for children with only ADD, and 51 percent for children with both diagnoses. Among children with a diagnosis of neither ADD nor LD, 23 percent had four or more health care visits during the past 12 months.

Introduction

In the last 30 years, the diagnosis and treatment of behavioral and learning disorders have become major health concerns for school-aged children in the United States. An increasing number of adults have identified underachievement and failure in school as serious problems facing youth (1). At the same time, educators have reported a rise in the number of school-aged children with disabling behavioral and learning disorders (2). Finally, pediatricians have noted an increasing number of outpatient visits related to psychosocial conditions in children. Results from a national survey of pediatricians in 1996, for example, reported that 19 percent of all pediatric visits involved a child or an adolescent with a psychosocial problem requiring attention or intervention. As the authors of this study note: ". . . psychosocial problems are the most common chronic condition for pediatric visits, eclipsing asthma and heart disease" (3).

The increased prevalence of behavioral and learning problems in school-aged children has been linked to changes occurring in families, schools, and medical practice. In families, marital instability, inadequate day care, and poverty have adversely affected children's lives and contributed to the rise of behavioral and learning problems (4,5). In schools, legislative and judicial mandates have expanded special education services (6,7). In medical practice, widespread acceptance of drug therapy for behavioral disorders has facilitated diagnosis and treatment of these conditions in ambulatory care settings (8,9). Lack of health care insurance and limited access to mental health services, though, have very likely left conditions in some children undiagnosed and untreated (10).

The present study examines two disorders linked to behavioral and learning problems in school-aged children, ADD and LD. Although ADD and LD are among the most widely researched conditions of childhood, limited information is available on the national prevalence of these disorders and on the sociodemographic characteristics of U.S. children having these disorders. The present study explores the epidemiology of ADD and LD with data from a large, nationally representative health survey. The epidemiology of ADD and LD is investigated first, by estimating the prevalence of diagnosed ADD and LD, and secondly, by describing the sociodemographic characteristics, other health conditions, and use of educational and health care services by children with and without diagnosed ADD and LD. In contrast to previous studies that have examined the characteristics of children with ADD and LD separately, the present report takes into account the frequent joint occurrence of ADD and LD and presents data for children in the following diagnostic categories: children with neither a diagnosis of ADD nor LD (NEITHER), those with a diagnosis of ADD, but not LD (ADD/noLD), those with a diagnosis of LD, but not ADD (LD/noADD), and those with a diagnosis of both ADD and LD (BOTH). Throughout the report, results are shown for all children 6–11 years of age and for boys and girls separately.

Data and Methods

Survey Procedures

The data source for the results reported here is the 1997 and 1998 National Health Interview Survey (NHIS). The NHIS is a nationally representative household survey conducted by the National Center for Health Statistics (NCHS) that collects information on health status, use of health care, and sociodemographic characteristics of the civilian noninstitutionalized population. The design of the NHIS sample permits the merging of data from 1997 and 1998 into a single sample (11). During these two survey years, 78,041 households participated in the NHIS resulting in a response rate of 92 percent in 1997 and 90 percent in 1998.

In each family with children under 18 years of age, one child was randomly selected. Additional information for this child was obtained by interviewing an adult family member who was knowledgeable about the child's health (12). The present report focuses on data for the 8,647 children 6–11 years of age in the child sample. The response rate for the sample child section of the NHIS was 84 percent in 1997 and 82 percent in 1998. In over 90 percent of the families, a parent was the respondent providing information about the sample child. Data were collected on sociodemographic characteristics,

including a child's age at interview, sex, race, ethnicity, birthweight, family structure, family income, residence in a metropolitan statistical area (MSA), and health insurance coverage. Information on health conditions included diagnoses of ADD, LD, mental retardation and other developmental delays, vision and hearing problems, allergies, asthma, and other chronic health conditions. Use of educational services was measured by asking if a child was currently receiving special education or early intervention services. Because only school-aged children are included in the present analysis, the services received refer to special education programs. Use of health care services during the past 12 months was assessed by asking if a child had contact with various types of health care providers and how often a child was seen by a health care provider. Use of medication was determined by asking if a child had a condition for which he or she had regularly taken prescription medication for at least 3 months. (See Appendix I, Technical Notes for more information about the NHIS sample and survey questionnaire.)

Percents and standard errors were calculated using SUDAAN, a statistical program for survey data analysis that adjusts for the effects of complex sampling designs (13). Differences between percents were evaluated for statistical significance at the 0.05 level with two-sided tests. (See Appendix I, Technical Notes for details.) The estimated number of children with diagnoses of ADD and/or LD (NEITHER, ADD/noLD, LD/noADD, and BOTH) are shown by selected sociodemographic characteristics in table A.

Measurement of Diagnosed Attention Deficit Disorder and Learning Disability

A history of diagnosed ADD and LD was determined by responses to the following questions:

- Has a doctor or health professional ever told you that (sample child) had Attention Deficit Disorder?
- Has a representative from a school or a health professional ever told you that (sample child) had a learning disability?

The term, "Attention Deficit Disorder" refers to clinical diagnoses of ADD and ADHD (Attention Deficit Hyperactivity Disorder), including all subtypes for ADD and ADHD. The term, "Learning Disability" refers to different types of specific learning disabilities, namely disabilities in listening, speaking, basic reading skills, reading comprehension, written expression, mathematical calculation, and mathematical reasoning. The item nonresponse rate for the questions on ADD and LD was 0.5 percent. Forty-six children who had missing information on ADD or LD were excluded from the analysis.

The age at which children were diagnosed with ADD or LD was not obtained. Most children, however, are diagnosed with ADD or LD in elementary school (14). The present study focuses on children 6–11 years of age in an effort to examine the characteristics of children with recent diagnoses of ADD and LD. Diagnoses reported by parents were not verified by comparing survey responses with information from children's medical or school records. Finally, undiagnosed cases of ADD and LD were not included in the present analysis because the survey questions asked parents to report only diagnosed cases of ADD and LD.

Results

Prevalence of Attention Deficit Disorder and/or Learning Disability

Among children 6–11 years of age, nearly 7 percent were reported to have a diagnosis of ADD and approximately 8 percent a diagnosis of LD. Specifically, 3 percent of children 6–11 years of age had ever been diagnosed with ADD/noLD, 4 percent with LD/noADD, and 4 percent with BOTH (table B). The prevalence of ever having a diagnosis of ADD/noLD, LD/noADD, or BOTH was higher among children 9–11 years of age than among those 6–8 years of age. The prevalence of ADD was also greater in boys than in girls, almost three times greater for a diagnosis of ADD/noLD and over two times greater for a diagnosis of both ADD and LD. In contrast, the prevalence of LD/noADD was not significantly different for boys and girls. The effect of race and ethnicity varied by diagnostic category. White non-Hispanic children were more often diagnosed with ADD/noLD than black non-Hispanic or Hispanic children. Racial and ethnic differences in the percent of all children with LD (LD/noADD and BOTH) were not statistically significant.

The effect of other sociodemographic characteristics varied among the diagnostic categories. Low birthweight was related to having a diagnosis of LD/noADD but not ADD (ADD/noLD and BOTH). Living in a mother-only or low-income family was linked to having LD (LD/noADD or BOTH) but not to ADD/noLD. Having either private or public health insurance was associated with a diagnosis of ADD/noLD. The percent of children with LD (LD/noADD and BOTH) was greater among children with Medicaid than among those with private insurance or no insurance. Neither ADD nor LD was related to living in a metropolitan area.

Among boys, the variables associated with a diagnosis of ADD and LD were generally similar to the predictors for all children. Among girls, the overall pattern of results was also similar to that of all children, but fewer variables were significantly associated with the diagnoses of ADD and LD.

Other Health Conditions

Children in the diagnostic categories of ADD/noLD, LD/noADD, and BOTH differed in regard to the prevalence of other health conditions as compared with children with neither a diagnosis of ADD nor LD. Table C shows the prevalence of five health conditions: mental retardation and other developmental delays, problems with vision and hearing, allergies, asthma, and other chronic health conditions.

Table A. Number of children 6–11 years of age by diagnosed Attention Deficit Disorder and/or Learning Disability, according to selected characteristics: United States, 1997–98

Characteristic	All children[1]	NEITHER[2]	ADD/noLD[3]	LD/noADD[4]	BOTH[5]	All children[1]	NEITHER[2]	ADD/noLD[3]	LD/noADD[4]	BOTH[5]
	Average annual population estimates (Number in 1,000s)					Sample size				
Total	24,160	21,527	784	1,010	839	8,601	7,697	270	345	289
Sex										
Boys	12,311	10,556	582	576	597	4,413	3,806	202	197	208
Girls	11,850	10,970	203	434	242	4,188	3,891	68	148	81
Age										
6–8 years	12,195	11,171	281	409	333	4,358	3,993	106	146	113
9–11 years	11,966	10,355	503	601	506	4,243	3,704	164	199	176
Race/ethnicity[6]										
White non-Hispanic	15,789	13,944	649	621	575	4,629	4,084	193	180	172
Black non-Hispanic	3,735	3,312	69	201	153	1,415	1,264	34	62	55
Hispanic	3,573	3,268	48	165	93	2,237	2,049	35	95	58
Birthweight										
Low (less than 2,500 grams)	1,529	1,254	65	134	75	608	509	21	45	33
Not low (2,500 grams or more)	21,171	18,975	680	819	697	7,452	6,697	233	285	237
Family structure[7]										
Mother and father	17,497	15,848	525	609	514	5,808	5,262	168	198	160
Mother only	5,308	4,538	203	325	242	2,200	1,901	80	117	102
Family income										
$20,000 or more	18,133	16,334	606	661	532	6,128	5,535	202	222	169
Less than $20,000	5,021	4,288	143	302	287	2,069	1,791	59	105	114
Residence in MSA[8]										
Central city, MSA	6,553	5,862	190	294	208	2,694	2,427	78	104	85
Not central city, MSA	12,676	11,324	442	493	418	4,334	3,880	139	173	142
Not MSA	4,931	4,341	153	223	214	1,573	1,390	53	68	62
Health insurance coverage										
Uninsured	3,121	2,847	58	142	75	1,283	1,177	27	50	29
Medicaid[9]	3,738	2,982	158	304	295	1,434	1,159	54	107	114
Private[10]	17,165	15,576	566	562	461	5,823	5,307	187	186	143

ADD is Attention Deficit Disorder.
LD is Learning Disability.
[1]Data do not include children with unknown responses to the questions on ADD and LD.
[2]NEITHER includes children who have never had a diagnosis of either ADD or LD.
[3]ADD/noLD includes children who have ever had a diagnosis of ADD and have never had a diagnosis of LD.
[4]LD/noADD includes children who have ever had a diagnosis of LD and have never had a diagnosis of ADD.
[5]BOTH includes children who have ever had a diagnosis of both ADD and LD.
[6]Data are not shown for non-Hispanic children of other races due to small sample size.
[7]Mother and father refer to biological, adoptive, step, and foster parents. Data are not shown for children in other family types due to small sample size.
[8]MSA is metropolitan statistical area.
[9]Medicaid includes children insured only by Medicaid.
[10]Private includes children covered by private insurance, those with non-Medicaid public insurance, and those with both private and public insurance.

Among children with neither ADD nor LD, the percent reported to be mentally retarded or to have other developmental delays was 1 percent. Among children with ADD/noLD, the percent with mental retardation or other developmental delays could not be precisely estimated, but the number of children with these disorders was small (n = 18). By contrast, among children with LD, the percent with mental retardation or other developmental delays was substantially greater, 31 percent for those with LD/noADD and 34 percent for those with BOTH. Further, the percent of the children with LD reported to be mentally retarded was 8 percent for those with LD/noADD and 10 percent for those with both ADD and LD (data not shown in table C).

Health problems, including impaired vision and hearing, allergies, and chronic health conditions other than asthma, were reported more frequently for children with LD (LD/noADD and BOTH) than for children with neither ADD nor LD. For example, among children with LD/noADD, the percent reported to have other chronic health conditions was over twice that of children with neither ADD nor LD.

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Table B. Percent of children 6–11 years of age with Attention Deficit Disorder and/or Learning Disability by sex, according to selected characteristics: United States, 1997–98

Characteristic	All children			Boys			Girls		
	ADD/noLD[1]	LD/noADD[2]	BOTH[3]	ADD/noLD[1]	LD/noADD[2]	BOTH[3]	ADD/noLD[1]	LD/noADD[2]	BOTH[3]
	Percent (standard error)								
Total	3.3 (0.23)	4.2 (0.27)	3.5 (0.23)	4.7 (0.37)	4.7 (0.39)	4.9 (0.39)	1.7 (0.26)	3.7 (0.37)	2.0 (0.28)
Age									
6–8 years	2.3 (0.27)	3.4 (0.31)	2.7 (0.30)	3.3 (0.47)	3.8 (0.45)	4.0 (0.50)	1.3 (0.28)	2.9 (0.43)	1.5 (0.34)
9–11 years	4.2 (0.40)	5.0 (0.43)	4.2 (0.37)	6.1 (0.64)	5.6 (0.60)	5.7 (0.60)	2.2 (0.44)	4.4 (0.61)	2.6 (0.43)
Race/ethnicity[4]									
White non-Hispanic	4.1 (0.33)	3.9 (0.33)	3.6 (0.30)	6.0 (0.53)	4.2 (0.45)	5.0 (0.50)	2.1 (0.37)	3.7 (0.46)	2.2 (0.38)
Black non-Hispanic	1.8 (0.34)	5.4 (0.84)	4.1 (0.67)	2.7 (0.62)	7.6 (1.40)	6.5 (1.14)	*	3.2 (0.83)	*
Hispanic	1.4 (0.29)	4.6 (0.71)	2.6 (0.40)	1.8 (0.39)	4.8 (0.75)	3.1 (0.61)	*	4.5 (1.22)	2.0 (0.50)
Birthweight									
Low (Less than 2,500 grams)	4.3 (1.04)	8.8 (1.37)	4.9 (1.06)	6.9 (1.95)	8.7 (1.90)	6.5 (1.56)	*	8.8 (1.99)	*
Not low (2,500 grams or more)	3.2 (0.25)	3.9 (0.29)	3.3 (0.24)	4.7 (0.40)	4.6 (0.42)	4.6 (0.42)	1.7 (0.28)	3.1 (0.36)	2.0 (0.29)
Family structure[5]									
Mother and father	3.0 (0.27)	3.5 (0.28)	2.9 (0.26)	4.4 (0.45)	4.0 (0.41)	3.8 (0.42)	1.5 (0.27)	3.0 (0.36)	2.0 (0.34)
Mother only	3.8 (0.55)	6.1 (0.76)	4.6 (0.55)	5.4 (0.85)	6.6 (0.94)	7.0 (0.95)	*	5.7 (1.15)	2.0 (0.52)
Family income									
$20,000 or more	3.3 (0.27)	3.7 (0.27)	2.9 (0.26)	4.8 (0.45)	3.9 (0.38)	4.2 (0.43)	1.9 (0.31)	3.4 (0.39)	1.7 (0.29)
Less than $20,000	2.8 (0.46)	6.0 (0.82)	5.7 (0.63)	4.3 (0.78)	7.4 (1.11)	7.3 (0.97)	*	4.5 (1.10)	3.9 (0.82)
Health insurance coverage									
Uninsured	1.9 (0.39)	4.6 (0.91)	2.4 (0.50)	2.9 (0.72)	5.1 (1.08)	3.6 (0.81)	*	*	*
Medicaid[6]	4.2 (0.72)	8.1 (0.99)	7.9 (0.88)	6.1 (1.22)	9.2 (1.40)	11.0 (1.42)	*	6.9 (1.31)	4.4 (1.04)
Private[7]	3.3 (0.28)	3.3 (0.27)	2.7 (0.26)	4.8 (0.46)	3.6 (0.39)	3.6 (0.42)	1.8 (0.31)	2.9 (0.36)	1.7 (0.30)
Residence in MSA[8]									
Central city, MSA	2.9 (0.39)	4.5 (0.56)	3.2 (0.40)	4.1 (0.68)	5.0 (0.75)	4.7 (0.70)	1.7 (0.41)	4.0 (0.86)	1.6 (0.42)
Not central city, MSA	3.5 (0.36)	3.9 (0.33)	3.3 (0.33)	5.1 (0.59)	4.5 (0.49)	4.5 (0.53)	1.9 (0.40)	3.3 (0.44)	2.1 (0.40)
Not MSA	3.1 (0.44)	4.5 (0.71)	4.3 (0.59)	4.7 (0.75)	4.8 (0.99)	5.9 (0.94)	*	4.2 (0.89)	2.5 (0.70)

ADD is Attention Deficit Disorder.

LD is Learning Disability.

* Figure does not meet standard of reliability or precision.

[1]ADD/noLD includes children who have ever had a diagnosis of ADD and have never had a diagnosis of LD.

[2]LD/noADD includes children who have ever had a diagnosis of LD and have never had a diagnosis of ADD.

[3]BOTH includes children who have ever had a diagnosis of both ADD and LD.

[4]Data are not shown for non-Hispanic children of other races due to small sample size.

[5]Mother and father refer to biological, adoptive, step, and foster parents. Data are not shown for children in other family types due to small sample size.

[6]Medicaid includes children insured only by Medicaid.

[7]Private includes children covered by private insurance, those with non-Medicaid public insurance, and those with both private and public insurance.

[8]MSA is metropolitan statistical area.

Among children with both ADD and LD, the percent with other chronic conditions was three times that of children with neither diagnosis. However, the percent with other chronic health conditions did not differ significantly between children with ADD/noLD and those with neither ADD nor LD.

Use of Special Education

The use of special education differed substantially between children without LD (NEITHER and ADD/noLD) as compared with children with LD (LD/noADD and BOTH) (table D). Among children with the diagnosis of LD, overall 54 percent were in special education. This was nearly 5 times greater than the percent observed for children with ADD/noLD and over 23 times the percent reported for children with neither ADD nor LD. Among children with LD/noADD, 46 percent attended special education, and among those with both ADD and LD, 65 percent were in special education. Among children with LD, the percent of boys and girls in special education was similar.

Use of Health Care Services

Whether a child had contact with a mental health professional during the past 12 months also differed markedly among children in the various diagnostic categories (table D). Among children with neither ADD nor LD, only 3 percent had contact with a mental health professional during the past 12 months. Among children diagnosed with ADD or LD, the percent having contact with a mental health professional was 17 percent for those with LD/noADD,

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Table C. Percent of children 6–11 years of age with selected health conditions by diagnosed Attention Deficit Disorder and/or Learning Disability, according to sex: United States, 1997–98

Health conditions	NEITHER[1]	ADD/noLD[2]	LD/noADD[3]	BOTH[4]
		Percent (standard error)[5]		
All children				
Mental retardation/ODD[6]	1.3 (0.16)	*	30.7 (2.97)	34.4 (3.38)
Hearing or vision problems[7]	3.0 (0.23)	*	12.2 (2.22)	9.5 (2.07)
Allergies[8]	27.3 (0.61)	31.7 (3.63)	35.6 (3.05)	39.3 (3.27)
Asthma[9]	12.1 (0.44)	17.4 (2.64)	16.5 (2.46)	16.6 (2.63)
Other chronic health condition[10]	4.1 (0.26)	4.6 (1.23)	9.7 (1.77)	12.5 (2.42)
Boys				
Mental retardation/ODD[6]	2.0 (0.30)	*	30.4 (3.76)	34.5 (3.98)
Hearing or vision problems[7]	2.8 (0.32)	*	10.6 (2.46)	7.8 (2.24)
Allergies[8]	28.4 (0.89)	31.6 (4.33)	36.8 (3.76)	39.0 (3.64)
Asthma[9]	15.0 (0.73)	18.7 (3.06)	17.9 (3.03)	19.7 (3.32)
Other chronic health condition[10]	4.1 (0.36)	*	8.8 (2.04)	10.8 (2.46)
Girls				
Mental retardation/ODD[6]	0.6 (0.14)	*	31.2 (4.80)	34.2 (6.64)
Hearing or vision problems[7]	3.2 (0.33)	*	14.3 (3.85)	*
Allergies[8]	26.1 (0.85)	31.9 (6.63)	34.0 (4.93)	39.8 (6.84)
Asthma[9]	9.2 (0.55)	*	14.6 (4.02)	*
Other chronic health condition[10]	4.2 (0.36)	*	11.0 (3.11)	*

ADD is Attention Deficit Disorder.

LS is Learning Disability.

* Figure does not meet standard of reliability or precision.

[1]NEITHER includes children who have never had a diagnosis of either ADD or LD.

[2]ADD/noLD includes children who have ever had a diagnosis of ADD and have never had a diagnosis of LD.

[3]LD/noADD includes children who have ever had a diagnosis of LD and have never had a diagnosis of ADD.

[4]BOTH includes children who have ever had a diagnosis of both ADD and LD.

[5]Unknowns for the variables of interest are not included in denominators used for the calculation of percents and standard errors.

[6]Parental report of diagnosed mental retardation or other developmental delay, autism, or Down syndrome.

[7]Parental report of blindness, deafness, or serious difficulty seeing or hearing.

[8]Parental report of a digestive allergy, skin allergy, hay fever, respiratory allergy, or frequent ear infections (three or more) during the past 12 months.

[9]Parental report of ever having a diagnosis of asthma.

[10]Parental report of diagnosed Cerebral Palsy, Muscular Dystrophy, Cystic Fibrosis, Sickle Cell Anemia, Diabetes, Arthritis, or heart disease; also a parental report of frequent diarrhea or colitis, anemia, or seizures during the past 12 months.

34 percent for those with ADD/noLD, and 51 percent for those with both ADD and LD. The percent of boys and girls having contact with a mental health professional did not differ.

The use of prescription medication also varied by diagnostic category. Among children with neither a diagnosis of ADD nor LD, only 6 percent used prescription medication on a regular basis. Among children with a diagnosis of LD/noADD, medication use was greater, but still modest at 14 percent. In contrast, medication use was substantially greater among children with a diagnosis of ADD, 54 percent for children with ADD/noLD and 61 percent for children with both ADD and LD. Use of prescription medication was similar among boys and girls with ADD/noLD, but greater for boys than for girls among children with both ADD and LD.

The percent of children having contact with a medical specialist other than a mental health professional was greater for children with either a diagnosis of ADD or LD than for those with neither diagnosis. The percent having contact with a therapist, such as a physical or occupational therapist, was greater for children with LD (LD/noADD and BOTH) than for children with neither ADD nor LD. Finally, approximately one-half of the children with ADD (ADD/noLD and BOTH) had four or more health care visits during the past 12 months as compared with less than a quarter of children with neither diagnosis. Slightly over a third of children with LD/noADD had frequent health care visits. In each diagnostic category, the percent of boys and girls with frequent health care visits was similar.

Discussion

This report presents findings from the first national health survey to collect data on two major behavioral and learning disorders, diagnosed ADD and LD. These results show that ADD and LD are among the most common chronic conditions affecting school-aged children in the United States. Over 2.6 million children 6–11 years of age were reported to have either a diagnosis of ADD or LD. The consequences of ADD and LD for children, their families, and society are considerable (10,15,16). For children, these conditions interfere with academic achievement and social development. For families, these conditions require diagnostic and treatment services that are often not covered by health

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Table D. Percent of children 6–11 years of age using selected educational and health care services by diagnosed Attention Deficit Disorder and/or Learning Disability according to sex: United States, 1997–98

Educational and health care services	NEITHER[1]	ADD/noLD[2]	LD/noADD[3]	BOTH[4]
		Percent (standard error)[5]		
All children				
Enrolled in special education[6]	2.3 (0.20)	11.7 (2.20)	45.9 (3.24)	64.7 (3.18)
Contacted a mental health professional[7]	3.4 (0.26)	33.9 (3.43)	16.5 (2.50)	51.1 (3.72)
Used prescription medication[8]	5.8 (0.30)	53.6 (3.55)	13.8 (2.12)	61.4 (3.47)
Contacted a medical specialist[9]	9.4 (0.41)	20.3 (3.24)	17.0 (2.37)	28.4 (3.17)
Contacted a therapist[10]	3.9 (0.27)	*	26.2 (3.02)	24.8 (2.97)
Had four or more health care visits[11]	22.6 (0.60)	44.8 (3.56)	34.3 (3.13)	50.6 (3.77)
Boys				
Enrolled in special education[6]	2.9 (0.33)	11.8 (2.49)	48.5 (4.12)	63.3 (3.83)
Contacted a mental health professional[7]	3.9 (0.41)	35.2 (3.92)	17.9 (3.20)	53.3 (4.23)
Used prescription medication[8]	6.7 (0.46)	55.7 (4.20)	16.1 (2.87)	68.2 (4.10)
Contacted a medical specialist[9]	9.5 (0.57)	21.3 (3.88)	17.5 (3.25)	28.9 (3.81)
Contacted a therapist[10]	4.2 (0.39)	*	27.2 (3.67)	25.7 (3.46)
Had four or more health care visits[11]	22.4 (0.84)	44.5 (4.01)	34.9 (4.00)	52.8 (4.27)
Girls				
Enrolled in special education[6]	1.7 (0.23)	*	42.5 (5.10)	66.0 (6.45)
Contacted a mental health professional[7]	2.9 (0.33)	30.0 (6.79)	14.7 (3.93)	45.7 (6.63)
Used prescription medication[8]	5.0 (0.39)	47.7 (6.99)	10.7 (3.11)	44.7 (6.77)
Contacted a medical specialist[9]	9.2 (0.55)	*	16.3 (3.76)	27.3 (6.24)
Contacted a therapist[10]	3.5 (0.38)	*	24.8 (4.81)	22.8 (5.47)
Had four or more health care visits[11]	22.8 (0.81)	45.9 (7.39)	33.5 (4.75)	45.3 (6.83)

ADD is Attention Deficit Disorder.

LD is Learning Disability.

* Figure does not meet standard of reliability or precision.

[1]NEITHER includes children who have never had a diagnosis of either ADD or LD.

[2]ADD/noLD includes children who have ever had a diagnosis of ADD and have never had a diagnosis of LD.

[3]LD/noADD includes children who have ever had a diagnosis of LD and have never had a diagnosis of ADD.

[4]BOTH includes children who have ever had a diagnosis of both ADD and LD.

[5]Unknowns for the variables of interest are not included in denominators used for the calculation of percents and standard errors.

[6]Receives special education services.

[7]Saw or spoke to a mental health professional such as a psychiatrist, psychologist, psychiatric nurse, or clinical social worker during the past 12 months.

[8]Has a condition for which prescription medication had been taken regularly for at least 3 months.

[9]Saw or spoke to a medical specialist (other than a gynecologist, psychiatrist, or ophthamalogist) during the past 12 months.

[10]Saw or spoke to a physical therapist, speech therapist, respiratory therapist, audiologist, or occupational therapist.

[11]Four or more visits to a doctor or other health professional during the past 12 months; overnight hospitalizations, emergency room visits, home visits, or telephone calls are not included.

insurance. Finally, for society, behavioral and learning disorders create substantial demands on institutions and individuals providing health care and educational services for children.

The NHIS is the first national survey to include questions on the prevalence of both diagnosed ADD and LD in school-aged children. Differences in the way in which ADD and LD were measured in other national and community-based studies make it difficult to compare these estimates with the results from the NHIS. Nonetheless, a comparison of the prevalence of ADD estimated from recent community-based studies with results from the present study places the 1997–98 NHIS estimate of 7 percent for ADD within the range of values reported in prior studies (4.5–12 percent) (14). A comparison of the prevalence of LD from the 1988 Child Health Survey (NHIS-CH) with the estimate from the present study shows a modest increase for children 6–11 years of age, from 7 percent to 8 percent (5). Data collected by the U.S. Department of Education also indicate a small increase in the percent of students less than 21 years of age with LD in special education, from 4.9 percent in 1988–89 to 5.9 percent in 1997–98 (18). Finally, the 1997 Survey of Income and Program Participation, which asked about a current learning disability, such as dyslexia, reported that 5 percent of children 6–14 years of age had LD (19).

In the medical and psychological literature, there are few studies assessing the accuracy with which parents report diagnosed behavioral and learning disorders. A comparison of maternal reports about children's physical health with information in medical records, though, has generally shown a high level of agreement between these sources for serious health conditions entailing ongoing care such as asthma (20). An evaluation of diagnostic reporting in the NHIS, which compared survey responses with data from medical records, also demonstrated greater agreement for conditions requiring a physician's diagnosis and care (21). In the case of health events such as injuries, survey data obtained from parents appear to be more complete than findings from medical records (20). Similarly, reports from a parent about diagnosed ADD and LD may also be preferable to information from either a child's medical or school record. A parent may be the one informant who

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can describe findings from evaluations by health care providers and school personnel and also provide detailed information about a child's sociodemographic characteristics. Although there is no way to assess the completeness of parental reports in the NHIS, the present study has attempted to minimize the effect of lapses in a parent's memory by limiting the analysis to young school-aged children.

Parents' understanding of the diagnostic terms used in the NHIS is another factor that may have affected responses to the questions about ADD and LD. In 1997 and 1998, the NHIS asked parents about a diagnosis of "Attention Deficit Disorder." Some parents who were told by a health professional that their child had ADHD or one of the specific diagnoses in the revised third edition of the Diagnostic Statistical Manual of Mental Disorders (DSM-III-R) or in the fourth edition (DSM-IV) may not have answered "yes" to a survey question asking about "Attention Deficit Disorder" (22,23). Although the relatively high prevalence rate of ADD in the present study suggests that underreporting of this diagnosis by parents was minimal, a rate based on only diagnosed cases of ADD may not represent the true extent of this disorder in children.

Parental understanding of diagnostic terms could also have influenced the findings about LD. To educators and clinicians, "Learning Disability" is a term that identifies children whose academic achievement is significantly below the level predicted by their measured intelligence or ability to learn. For example, the Individuals with Disabilities Education Act (IDEA), the major Federal legislation regulating special education services in public schools, defines a specific learning disability as a disorder in one or more basic psychological processes involved in understanding or in using language, spoken or written, that may manifest itself in an imperfect ability to listen, speak, read, write, spell, or to do mathematical calculations (24). IDEA further stipulates that the gap between a child's achievement and ability is one that is not primarily attributable to the result of visual, hearing, or motor disabilities, of mental retardation, of emotional disturbance, or of environmental, cultural, or economic disadvantage (24). To parents, though, LD may have a more general meaning and may be used to identify a broader group of underachieving children, including those with academic problems due to mental retardation, sensory deficits, serious psychological disorders, or socioeconomic deprivation.

Two findings from the present study suggest that some parents reported a diagnosis of LD for learning problems, which are not covered by the precise definition of this disorder. First, over one-half of the children in the 1997–98 NHIS who had a diagnosis of ADD were also reported to have a diagnosis of LD. Past studies of the joint occurrence of ADD and LD have demonstrated a greater risk of LD among children diagnosed with ADD. Estimates of the occurrence of LD among children with ADD, though, have ranged from 10–20 percent when stringent clinical criteria are used for the diagnosis of LD (25). The high proportion of children with both diagnoses in the present study raises the possibility that parents may have interpreted the term "Learning Disability" to include a broad range of academic problems including some that do not fit the criteria for LD. Secondly, the relatively high proportion of mentally retarded children who were described to have LD in the 1997–98 NHIS also suggests that parents may have interpreted the term "Learning Disability" broadly. However, it is possible that parental reports of diagnosed ADD, LD, and mental retardation for a particular child accurately reflect the different diagnoses provided by various health care and educational professionals.

In addition to problems with parental reporting of diagnoses, estimates of ADD and LD from the 1997–98 NHIS may have been affected by shifts in the diagnostic criteria used to identify these conditions. In the case of ADD, the present study includes parents' reports of diagnoses based on the criteria of the DSM-III-R and DSM-IV (22,23). Moreover, some pediatricians and primary care physicians may not have used the criteria in either edition of DSM to diagnose ADD (26). Finally, health insurance coverage, access to mental health services, and attitudes of parents and providers are additional factors that may have influenced the extent to which children exhibiting similar behavioral problems were diagnosed as having ADD (10,27).

There is also some indication that the criteria used to identify LD may have shifted over time. Since the mid-1970s, an increasing number of students in special education programs have been identified as having LD. In 1976–77, children with specific learning disabilities constituted 1.8 percent of the children enrolled in public schools. By 1997–98, the percent had more than tripled and was 5.9 percent (18). The trend in LD is striking when contrasted with the nearly stable percent of children during the same period classified as having speech or language, hearing, orthopedic, or visual impairments. Changes in Federal, State, and local policies affecting diagnosis of LD, as well as increases in funding for special education services, are factors that may have influenced the identification of LD (7). Increased awareness among parents and educators about the academic consequences of specific learning disabilities, along with pressures created by rising standards in schools, may have been additional factors underlying the increase in the number of children diagnosed with LD.

Even with the limitations imposed by discrepancies in parental reports of diagnosed ADD and LD, the 1997–98 NHIS provides a rich source of information about these conditions for a large, nationally representative sample of school-aged children. Many findings from the present study confirm results from previous clinical and community-based investigations, such as the significantly higher prevalence of ADD in boys than in girls (28).

Other findings from the NHIS are new and show that the associations between sociodemographic characteristics and the diagnoses of ADD and LD vary depending on whether a child has one or both of these conditions. Having a diagnosis of

ADD/noLD was associated with being a white non-Hispanic child and having health insurance. In contrast, having a diagnosis of LD, with or without ADD, was linked to being a child in a low-income or mother-only family. Past research on ADD and LD has primarily focused on social and economic disadvantage as factors related to the development of these disorders. Few analyses have considered how health insurance coverage and higher socioeconomic status provide access to health care and facilitate the diagnosis and treatment of a behavioral condition such as ADD. If, as most data suggest, barriers to diagnosis and treatment are greater in health care systems than in educational systems, it is not surprising to find that health insurance coverage and being a white non-Hispanic child was associated with ADD/noLD, a condition often diagnosed by health care providers, but not with LD, a condition frequently identified by school personnel (10). Future longitudinal studies of the diagnosis of ADD and LD could clarify how access to health care and the availability of special education services influence the likelihood of having either or both of these diagnoses. Including measures of ADD and LD based on assessments of children, in addition to reported diagnoses, could clarify the effect of a child's sociodemographic characteristics on the development and identification of these disorders.

Data from the present study also show a consistent pattern of comorbidity when diagnoses of both ADD and LD are taken into account. A comparison of children with ADD/noLD with children having a diagnosis of neither ADD nor LD did not show striking differences in the prevalence of other health conditions. A different pattern emerged when the health conditions of children with LD (with or without ADD) were compared with children with neither diagnosis. A greater percent of children with LD were reported to have cognitive, sensory, and other chronic health conditions. While results from past studies of LD have indicated a higher prevalence of other health problems among children with this disorder, the results from studies of ADD have been mixed (29). Data from the 1997–98 NHIS suggest that knowing whether a child with ADD also has a diagnosis of LD is relevant since it may indicate an increased risk for other health conditions.

Finally, greater use of a variety of health care services was reported for children with diagnosed ADD and/or LD. Children with ADD (ADD/noLD and BOTH) were identified as using prescription medication and mental health services more often than children with only LD. The greater use of medication and mental health services by children with ADD, reported in the 1997–98 NHIS, is consistent with earlier results from the 1988 NHIS-CH, which showed a greater use of health care services among children with behavioral problems (30). Results from the 1997–98 NHIS also suggest that the greater use of health care documented in a cohort study of children with ADD in Rochester, Minnesota may be indicative of greater use of health care by children with ADD throughout the United States (31). Finally, the present study indicates that, among children with diagnoses of ADD/noLD, LD/noADD, and BOTH, use of educational and health care services was generally similar for boys and girls.

As more years of data are collected in the NHIS, it will be possible to expand the analysis of child and family characteristics associated with the diagnoses of ADD and LD. Analyses incorporating characteristics of communities as well as characteristics of children and their families may provide insight into the effect of local health care and educational practices on the diagnosis of ADD and LD (32). Finally, data from the NHIS provide a way to measure trends in the diagnosis of ADD and LD and in the use of educational and health care services by children with these diagnoses.

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Appendix I

Technical Notes

Source of Data

The NHIS has collected information since 1957 from U.S. households about health and use of health care. Each year a nationally representative sample of the civilian noninstitutionalized population is selected and interviewed. Excluded from the sample are persons residing in nursing homes or other institutionalized settings, members of the Armed Forces (although their dependents are included), and U.S. nationals living abroad. Information about the health and demographic characteristics of each household member is collected in person by trained interviewers from the U.S. Bureau of the Census. Responses for household members may be obtained by self or proxy report.

In 1997 the NHIS was extensively redesigned. The annual NHIS questionnaire, now called the Basic Module, collects data from all family members (Family Core), a sample adult (Sample Adult Core), and a sample child (Sample Child Core). The current report uses data for the sample child contained in the Family Core and Sample Child Core. Estimates in this report are based on information from NCHS in-house files. Standard errors were calculated using information about the sample design available from in-house files. A detailed description of the NHIS sample design and survey questionnaires for 1997 and 1998 is available from the NCHS Web site: http://www.cdc.gov/nchs/nhis.htm.

Treatment of Unknown Values

Unknown values (responses coded as "refused," "don't know," or "not ascertained") for ADD, LD, and the variables related to other health conditions and educational and health care services are not included in the denominators used to calculate percents. Unknown values for sociodemographic variables are not shown in the tables because of the small number of children with these responses. Overall, the percent of unknown values for the variables presented in this report is low, less than 1 percent. Two variables have a higher percent of unknown values: birthweight (6 percent) and family income at/above and below $20,000 (4 percent).

Precision of Estimates

The relative standard error (RSE) of an estimate is used as the criterion of precision. The RSE was calculated by dividing the standard error of each estimate by the estimate itself and expressing it as a percent. Estimates with an RSE of 30 percent or greater do not meet the NCHS standard of adequate reliability or precision. These estimates are not shown and are indicated by an asterisk (*) in the tables of this report. Standard errors were calculated using SUDAAN, a statistical package that adjusts for the effects of the complex design of the NHIS sample.

Tests of Significance

The test statistic used to determine whether the difference between two point estimates is significantly different from zero was calculated as:

$$Z = | X_a - X_b | / \sqrt{S_a^2 + S_b^2}$$

Here X_a and X_b represent two-point estimates, and S_a and S_b are the standard errors for these estimates. Point estimates being compared in this test are assumed to be independent. The critical value for a two-sided test indicating a statistically significant difference at the 0.05 level is 1.96. No adjustments were made for multiple comparisons.

Appendix II

Definition of Terms

Age—child's age in years at last birthday.

ADD—family report of a diagnosis of Attention Deficit Disorder by a doctor or health professional.

ADD/noLD—family report of a diagnosis of Attention Deficit Disorder without a diagnosis of Learning Disability.

BOTH—family report of a diagnosis of Attention Deficit Disorder and Learning Disability.

Contact with health care provider—visit or conversation with a physician or other health professional about the child's health.

Developmental delay—significant delay in one of several areas: physical development, cognitive (mental) development, social or emotional development, or adaptive development.

DSM—Diagnostic and Statistical Manual of Mental Disorders, the standard manual for diagnosis of mental disorders in the United States.

DSM-III-R—revised third edition of the Diagnostic and Statistical Manual of Mental Disorders.

DSM-IV—fourth edition of the Diagnostic and Statistical Manual of Mental Disorders.

Family structure—parents(s) present in the household with the child. Mother and father refer to biological, adoptive, step, and foster parents.

Family income—wages, salaries, government payments, child support/alimony, dividends, help from relatives, and other sources of family income during the calendar year prior to the interview. Each member of a family is classified by the total income of the family. Low family income is defined as an annual income of less than $20,000.

Health care visit—visits to a health care professional; not including overnight hospitalizations, emergency room visits, home visits, or telephone calls.

Health insurance coverage— insurance coverage at the time of interview including the following categories: Medicaid and other related public insurance (e.g., most State-sponsored insurance coverage), private and other types of insurance (e.g., Medicare, military health insurance coverage, or another form of government-sponsored

health insurance coverage), and uninsured. Children with only Indian Health Service coverage are considered uninsured. Children classified as having Medicaid coverage include children with only Medicaid coverage.

IDEA—Individuals with Disabilities Education Act, Federal legislation mandating free and appropriate public education for students with disabilities.

LD—family report of a diagnosis of Learning Disability by a representative from a school or a health professional.

LD/noADD—family report of a diagnosis of Learning Disability without a diagnosis of Attention Deficit Disorder.

MSA—metropolitan statistical area, a county or group of counties containing at least one city having a population of 50,000 or more plus adjacent counties that are metropolitan in character and economically and socially integrated with the central city.

Central city—largest city in an MSA.

Not central city—part of an MSA that is not the central city.

Not in MSA—all other places in the country.

NEITHER—family report of a diagnosis of neither Attention Deficit Disorder nor Learning Disability.

NHIS—National Health Interview Survey.

NHIS-CH—1988 Child Health Survey, a supplement to the National Health Interview Survey.

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For answers to questions about this report or for a list of reports published in these series, contact:

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